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Performance of energy-saving water exchange device used in tidal wetland to improve water quality

Hou Wen-Shang (1), Teng Te-Hui (2), Hsieh Hwey-Lian (3), Chen Chang-Po (4), and Huang Shou-Chung (5)

(1) National Taiwan University, Department of Bioenvironmental Systems Engineering, Taipei city ,Taiwan, Republic of China (houws@ntu.edu.tw), (2) National Taiwan University, Department of Bioenvironmental Systems Engineering, Taipei city ,Taiwan, Republic of China (f92622045@ntu.edu.tw), (3) Biodiversity Research Center, Academia Sinica,Taipei city ,Taiwan, Republic of China (zohl@gate.sinica.edu.tw), (4) Biodiversity Research Center, Academia Sinica,Taipei city ,Taiwan, Republic of China (zocp@gate.sinica.edu.tw), (5) Biodiversity Research Center, Academia Sinica,Taipei city ,Taiwan, Republic of China (huang120@gate.sinica.edu.tw)

In natural waters, the stratification will happen to environmental conditions changes such as surface velocity, water temperature, depth, and dissolved oxygen. When the water depth closed to the sediment, water quality was usually present in inferior situation. Aerators, use to enhance water quality in lakes and reservoirs recent year is a physical purification without add chemical agents (for example: Alum) and the makeup water will not produce harmful substances. Aeration tally with the environment friendly concept of dealing with corrupt water and has good economic returns and improving efficiency. Continuous type aerator has a characteristic that consumes higher energy and cause the massive water bodies becoming turbulence under high-power motor operate. Turbulence will break the stratification fast and elevate dissolved oxygen. Under mixing action in the water will disturb original fish and the algae perches in different depth.

Hwa-Chiang waterfowl habitat is located in the heart of Taipei. Its core area, Taipei City Waterfowl Reservation, is one of internationally important tidal wetlands and has been designated as important bird area. However, the wetland has faced urban water pollution. This study focus on ecological conditions of the Hwa-Chiang waterfowl habitat used artificial tidal pond and Solar Energy Air-Lift Column (SEALC) to enhance water quality and habitat ecological biodiversity. SEALC is a water exchange device which consumes 3.5 watts motor continuous air into the air chamber, when the accumulation of different depths with different amount of air, and intermittent large bubble produced by buoyancy driven water exchange.

Established long-term measurement data of environment conditions to monitor system efficient, parameters included dissolved oxygen (DO) distribution, sediment oxygen demand (SOD), ORP, velocity and water temperature. Operate conditions such as water exchange capacity, economic benefits and working efficiency will be discussed.

Key words: tidal wetland, SEALC, artificial tidal pond, dissolved oxygen distribution, SOD, ORP.